IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:	Frank Olschewski et al.	Confirmation No:	7913
Application No:	10/809,960	Art Unit:	2624
Filed:	March 26, 2004	Examiner:	Rosario, Dennis
For:	Method for Performing Interactions on Microscopic Subjects that Change in Space and Time, and System Therefor		
Customer No.:	29127		
Attorney Docket No.	21295.78 (H5780US)		

APPELLANT'S BRIEF

Commissioner for Patents
P.O. Box 1450,
Alexandria, Virginia 22313-1450

Sir:

This is the Applicants' appeal from the final Office Action, mailed December 6, 2007 (Paper No. 20071116).

Real Party in Interest

Leica Microsystems CMS GmbH, the assignee of the present application, is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1-10 are pending in this application. Claims 1-10 stand finally rejected in the outstanding Office Action. The rejection of claims 1-10 is being hereby appealed.

Status of Amendments

All amendments presented prior to the Final Office Action have been entered. A proposed post final amendment to Claim 6 has not been entered.

Summary of Claimed Subject Matter

Claim 1 is directed to a method for performing interactions, using a microscope, on microscopic subjects that change in space and time (Paragraph [06]). The method of Claim 1 begins by acquiring at least one image of a sample that encompasses at least one microscopic subject (Paragraphs [07], [23], [35]). Next, the user defines virtual reference subjects on a discrete grid of the acquired image or images, in order to define regions (Paragraphs [08], [23], [35]), and a sequence of image data or volume data is automatically acquired (Paragraphs [09], [23], [38]). An optical flux based on the sequence of acquired images is then identified (Paragraphs [10], [23], [37], [38]), and the identified optical flux is applied to the defined reference subjects (Paragraphs [11], [23], [37], [38]). Finally, interactions are performed on the reference subject modified by the optical flux (Paragraphs [12], [22], [23], [24], [34], [35]).

Claim 2 is directed to the method as defined in Claim 1, wherein the virtual reference subjects are regions, discrete point sets, or local coordinate systems on the reference grid of the image sequence, and define interaction locations (Paragraph [23]).

Claim 3 is directed to the method as defined in Claim 1, wherein the interactions encompass a recovery of measured data of the subject or a controlled manipulation of the subject at the positions defined by the virtual reference subjects (Paragraph [24]).

Claim 4 is directed to the method as defined in Claim 3, wherein the recovery of the measured data comprises image data; geometrical data of the virtual reference subject, or magnitudes derived from geometrical data of the virtual reference subject; and determination of the intensity within the region defined by the virtual reference subject (Paragraph [24]).

Claim 5 is directed to the method as defined in Claim 3, wherein the controlled manipulation of the subject is accomplished with respect to the specific regions or

positions in the subject by means of radiation, for purposes of bleaching, photo activation, cage-compound release, and cutting and excision (Paragraphs [24], [40]).

Claim 6 is directed to a system for interactions on microscopic subjects that change in space and time (Paragraph [14]). The system of Claim 6 comprises a confocal scanning microscope that guides an illuminating light beam over a subject (Paragraphs [03], [15], [34]), several detectors that identify, from the light proceeding from the subject intensities from different spectral regions (Paragraph [16], [34]), and a processing unit (Paragraph [17], [22]). Further comprised in the system of Claim 6 is a PC (Paragraph [03], [18]), an input unit (Paragraph [03], [19]), and a display on which an individual image is presented to the user (Paragraph [20], [34]), wherein the user interactively defines virtual reference subjects on the image shown on the display, using the input unit for position definition (Paragraph [20], [34]). The processing unit includes a means for determining the optical flux based on the intensities from different spectral regions identified by the detectors (Paragraph [21], [23]), and a means for applying the optical flux to the virtual reference subjects (Paragraph [22], [23]), wherein the processing unit controls interactions on the basis of the changed reference subjects (Paragraph [22], [23], [34]).

Claim 7 is directed to the system as defined in Claim 6, wherein the virtual reference subjects are regions, discrete point sets, or local coordinate systems on the reference grid of the image sequence, and define interaction locations (Paragraph [23]).

Claim 8 is directed to the system as defined in Claim 6, wherein the interactions accomplish both a recovery of measured data of a subject and the controlled manipulation of the subject at the positions defined by the virtual reference subjects (Paragraph [24]).

Claim 9 is directed to the system as defined in Claim 8, wherein the recovery of the measured data comprises geometrical data, or magnitudes derived from geometrical data; and determination of the intensity within the region defined by the virtual reference subject (Paragraph [24]).

Claim 10 is directed to the system as defined in Claim 9, wherein the controlled manipulation of the subject is accomplished with respect to the specific regions or positions in the subject, the manipulation by means of radiation, for purposes of bleaching, photoactivation, cage-compound release, and cutting and excision (Paragraphs [24], [40]).

Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-10 are patentable under 35 U.S.C. 102(e) over Garakani et al. (US Patent Application Publication No. 2003/0185450 A1).

Argument

Claims 1-10 are rejected under 35 U.S.C. 102(e) over Garakani et al. (US Patent Application Publication No. 2003/0185450 A1). Applicants respectfully disagree and present the following arguments in support of patentability.

It is well established that a claim is anticipated under 35 U.S.C. §102, only if each and every element of the claim is found in a single prior art reference1. Moreover, to anticipate a claim under 35 U.S.C. §102, a single source must contain each and every element of the claim "arranged as in the claim."2 Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. 3 If each and every element of a claim is not found in a single reference, there can be no anticipation.

Regarding Claim 1, Applicants assert that the Garakani publication does not teach defining *virtual reference subjects in order to define regions* on the acquired image or images. As disclosed in the current Specification, a virtual reference subject of Claim 1 is a location or a group of locations in an image or a sequence of images (for example, Paragraphs [0035], [0037], [0039], and [0040]).

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1 Veregal Bros. v Union Oil Co. of California, 814 F.2d 628, 631, 2USPQ2d 1051, 1053 (Fed. Cir. 1987).
2 Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984). Lewmar Marine Inc. v. Barient, Inc., 827 F.2d 744, 747, 3 U.S.P.Q. 2d 1766, 1768 (Fed. Cir. 1987), cert. denied, 484 U.S. 1007 (1988).
3 Titanium Metals Corp. v. Banner, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).

Contrary to what is claimed in independent Claim 1, Garakani in paragraph [0178] cited by the Examiner with respect to the above elements of Claim 1, in its entirety reads:

> "In some embodiments, a set of user preferences can be used to specify how many sequential watershed frames identify a watershed event. For instance, in certain dynamic processes, a user might be interested in frames corresponding *to events taking place* in a very small number of frames. Such preferences could be established in units of time, frames or any other relevant metric."

For some reason that cannot be understood, the Examiner gives the phrase *"events taking place"* the meaning of defining regions within images. Furthermore, in the Advisory Action, responding to the Applicants comments, the Examiner adds that the phrase *"events taking place"* is "suggestive that *an event has an associated place*". The above paragraph refers to a user choosing frames (i.e. images) on the basis of what is happening in the frames and has nothing to do with a user defining locations within images. Applicants assert that the mere fact of some event happening or taking place in no way means that *virtual reference subjects* are defined in Garakani.

The Examiner further uses Paragraph [0187], line 8 of Garakani to state that Garakani identifies "brightness" to "locate objects", and thus considers that Garakani does define regions. Applicants assert that in Paragraph [0187] Garakani discusses methods and algorithms for detecting motion patterns to define objects that are subject to various changes:

> "*In biological applications, for example, objects are deformable, undergo morphological transformations, and float in fluid or crawl along the surface of culture dishes among other change. In some embodiments, the present invention provides algorithms that detect such motion patterns to define objects.*" (Garakani, Paragraph [0187]).

Applicants assert that the "objects" discussed in Paragraph [0187] are addressed in the present application as *microscopic subjects that change in space and time* (see, for example, Paragraphs [02], [03], [04], [35]). Applicants assert that nowhere in the disclosure does Garakani teach or suggest defining *virtual reference subjects* on the acquired image or images in the meaning of Claim 1 as defining a location or a group of locations *within images of the microscopic subject* (see, for example, Paragraph [35], Figure 3).

The Examiner also incorrectly concluded that *defining virtual reference subjects* is known from Paragraph [0184] of Garakani referring to the element "window size". However, Paragraph [0184], lines 3-4, of Garakani actually discusses "attention window size", which is defined as the length of a frame sequence (paragraph [0117] of Garakani). In other words, the term "window size" in Garakani refers to a length of a sequence of frames, which is completely different from the term "virtual reference subject" of Claim 1, which refers to a location or a group of locations in an image or a sequence of images.

The Examiner further states that Fig. 1, numeral 107, of Garakani shows defining regions. This is incorrect. It is asserted that Fig. 1 of Garakani does not show user defining any regions within images. Numeral 107, in particular, is defined in Paragraph [0111] of Garakani as "the output of the sensor", the latter meaning that numeral 107 identifies the *entire image*, not a region within an image.

Based on the above reasoning Applicants argue that the elements "user defines virtual reference subjects on a discrete grid of the acquired image or images, in order to define regions" are absent in the Garakani publication.

The Examiner further uses Figure 6 of Garakani, namely Numeral 605, to state that the elements "applying the identified optical flux to the defined reference subjects" are disclosed in Garakani. Applicants assert that, as disclosed in Paragraph [0173] of Garakani, Figure 6 illustrates self-similarity estimation, wherein Numeral 605 is referred to as "a moving attention window (605)". As already shown above, "attention window

size", is defined in Garakani as the length of a frame sequence (paragraph [0117] which has nothing to do with the defined reference subjects of the current invention.

The Examiner also refers to Figure 3 as a showing of the fact that Garakani teaches "applying the identified optical flux to the defined reference subjects". However, the only reference given to Figure 3 in Garakani, is that Figure 3 is a detailed block diagram of an embodiment of the analysis module. Applicants assert that, as seen from Figure 3, Numeral 306 refers to a unit for "object dynamic analysis", Numeral 307 refers to a "control" unit, Numeral 309 refers to a "selection" unit, Numeral 303 refers to a unit for "estimation of motion field", and Numeral 303 refers to a unit for "attention/capture/storage". It is evident that given the fact of the unit names in Figure 3 are indefinite, along with no details with respect to the units being included in the Garakani publication, it is really impossible to conclude that Figure 3 discloses "applying the identified optical flux to the defined reference subjects".

Based on the above reasoning Applicants assert that the elements "applying the identified optical flux to the defined reference subjects" are absent in the Garakani publication.

The Examiner further states that Figure 6 of Garakani, namely Numeral 605, teaches the elements "interactions are performed on the reference subject modified by the optical flux". As mentioned above, in Paragraph [0173] Numeral 605 is referred to as "a moving attention window (605)", wherein in Paragraph [0117] Garakani defines the "attention window size" as the length of a frame sequence, the latter having no relation whatsoever to the defined reference subjects of the current invention.

The Examiner also considers that Figure 3 teaches the elements "interactions are performed on the reference subject modified by the optical flux". Applicants assert that, as shown above, the unit names in Figure 3 are indefinite, and no details with respect to the units are included in the Garakani publication. Thus, there is no basis for the

Examiner's conclusion, that Figure 3 discloses the elements: "interactions are performed on the reference subject modified by the optical flux".

Based on the above reasoning Applicants assert that the elements "interactions are performed on the reference subject modified by the optical flux" are absent in the Garakani publication.

Thus, Applicants argue that as proven in detail above, Garakani fails to disclose defining virtual reference subjects in order to define regions. Nor does Garakani teach applying the identified optical flux to the defined reference subjects. Furthermore, nowhere in the disclosure does Garakani suggest performing interactions on the reference subject modified by the optical flux. In other words, Garakani does not teach or suggest each and every element of independent Claim 1. Therefore, the rejection of Claim 1 under 35 U.S.C. 102 has been incorrectly made and should be reversed and Claim 1 should be moved to allowance. Claims 2-5 depend directly or indirectly from Claim 1. Thus for reasons set forth above for Claim 1, Claims 2-5 should also be in condition for allowance.

Regarding Claim 6, Applicants assert that in contrast to Garakani, in the system of Claim 6 the user interactively defines virtual reference subjects on the image shown on the display using the input unit for position definition. Applicants respectfully submit that a virtual reference subject of Claim 6 is a location or a group of locations within an image or a sequence of images (see, for example, paragraphs [0035], [0037], [0039], and [0040] of the Specification).

According to the Examiner, Fig. 1 of Garakani shows user interactively defining virtual reference subjects on the image shown on the display using the input unit for position definition (Numeral 104). This is not so, because that Numeral 104 refers to a display showing a frame with two *objects* (using the terminology of Garakani), or two

microscopic subjects (using the terminology of the current invention) without defining any specific *virtual reference subjects within* the image or images of interest.

Thus, the element of user interactively defining virtual reference subjects on the image shown on the display using the input unit for position definition of Claim 6 is not taught or suggested in Garakani. Therefore, Claim 6 is patentable over Garakani under 35 U.S.C. §102(e) and should be allowed. Claims 7-10 depend directly or indirectly from Claim 6. Thus for reasons set forth above for Claim 6, Claims 7-10 should be allowed, as well.

For the foregoing reasons, Applicants argue that the pending rejections should be withdrawn, and that the present application should be allowed.

Respectfully submitted,

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Claims Appendix

Listing of Claims

1. (Previously presented) A method for performing interactions, using a microscope, on microscopic subjects that change in space and time, comprising:

acquiring at least one image of a sample that encompasses at least one microscopic subject;

defining by the user virtual reference subjects on a discrete grid of the acquired image or images, in order to define regions;

automatic acquiring of a sequence of image data or volume data;

successive identifying an optical flux based on the sequence of acquired images;

applying the identified optical flux to the defined reference subjects; and

performing interactions on the reference subject modified by the optical flux.

2. (Previously presented) The method as defined in Claim 1, wherein the virtual reference subjects are regions, discrete point sets, or local coordinate systems on the reference grid of the image sequence, and define interaction locations.

3. (Previously presented) The method as defined in Claim 1, wherein the interactions encompass a recovery of measured data of the subject or a controlled manipulation of the subject at the positions defined by the virtual reference subjects.

4. (Previously presented) The method as defined in Claim 3, wherein the recovery of the measured data comprises

image data;

geometrical data of the virtual reference subject, such as center point, area, periphery, or volume, or

magnitudes derived from geometrical data of the virtual reference subject, comprising at least one of velocity, acceleration, volume and area growth rates, and collision statistics of virtual reference subjects; and

determination of the intensity within the region defined by the virtual reference subject, by acquisition of an intensity distribution function and any desired parameters derived therefrom, such as mean, variance, skewness, or higher elements, as well as other parameters common in statistics such as quantile, median, or range width.

5. (Original) The method as defined in Claim 3, wherein the controlled manipulation of the subject is accomplished with respect to the specific regions or positions in the subject by means of radiation, for purposes of bleaching, photo activation, cage-compound release, and cutting and excision.

6. (Original): A system for interactions on microscopic subjects that change in space and time comprising:

a confocal scanning microscope that guides an illuminating light beam over a subject;

several detectors that identify, from the light proceeding from the subject, intensities from different spectral regions;

a processing unit;

a PC;

an input unit;

a display on which an individual image is presented to the user; the user interactively defines virtual reference subjects on the image shown on the display, using the input unit for position definition;

a means for determining the optical flux based on the intensities from different spectral regions identified by the detectors is housed in the processing unit; and

a means for applying the optical flux to the virtual reference subjects is present in the processing unit and the processing unit controls interactions on the basis of the changed reference subjects.

7. (Previously presented) The system as defined in Claim 6, wherein the virtual reference subjects are regions, discrete point sets, or local coordinate systems on the reference grid of the image sequence, and define interaction locations.

8. (Previously presented) The system as defined in Claim 6, wherein the interactions accomplishes both a recovery of measured data of a subject and the controlled manipulation of the subject at the positions defined by the virtual reference subjects.

9. (Previously presented) The system as defined in Claim 8, wherein the recovery of the measured data comprises

geometrical data such as center point, area, periphery, or volume, or

magnitudes derived from geometrical data, comprising at least one of velocity, acceleration, volume and area growth rates, and collision statistics of virtual reference subjects; and

determination of the intensity within the region defined by the virtual reference subject, by acquisition of the intensity distribution function and any desired parameters derived therefrom, such as mean, variance, skewness, or higher elements, as well as other parameters common in statistics such as quantile, median, or range width.

10. (Previously presented) The system as defined in Claim 9, wherein the controlled manipulation of the subject is accomplished with respect to the specific regions or positions in the subject, the manipulation by means of radiation, for purposes of bleaching, photoactivation, cage-compound release, and cutting and excision.

Evidence Appendix

None

Related Proceedings Appendix

None